

A new subspecies of *Hestina nicevillei* (Moore, 1896) (Lepidoptera, Nymphalidae) discovered in Northern Vietnam

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Abstract A species of the Apatulinae, *Hestina nicevillei* (Moore, 1896) was recently found in Hà-Giang, Northern Vietnam, and we here describe it as a new subspecies: *Hestina nicevillei magna*. It is also the first record of sympatry of the species with the allied species *H. assimilis* (Linnaeus, 1758). This subspecies is clearly distinguishable from other subspecies by its large size and much reduced black markings on the upperside of both wings, as well as a tiny, faint red submarginal spot on the hindwing reminiscent of the characteristic red markings of *H. assimilis*. It is known that *H. nicevillei* represents a classic case of Batesian mimicry, since the color pattern in all the subspecies hitherto known is remarkably similar to the local forms of *Aporia agathon* (Gray, 1831), which is considered to be offensive for birds. It is puzzling, however, that this model pierid species has thus far not been found in the area around Hà-Giang, although a large number of butterflies have been collected. On the other hand, *Aporia giganthea* Koiwaya, 1993, which is common there in spring, looks somewhat similar to ssp. *magna* in size and coloration. Furthermore, the white seasonal form of *Hestina assimilis* is also common, which at the first glance is almost indistinguishable from ssp. *magna* both in size and color pattern. Some possibilities regarding the origins of the unique features of *H. nicevillei magna* are discussed with special reference to the phenomena of mimicry and convergence.

Key words Nymphalidae, Apatulinae, *Hestina nicevillei*, *Hestina assimilis*, *Aporia agathon*, *Aporia giganthea*, Batesian mimicry, Northern Vietnam.

Introduction

Recently, a number of new or little known taxa of butterflies have been recorded from Northern Vietnam (Shinkai, 1999; Funahashi, 2003). In particular, many species hitherto known mainly from China were reported from Hà-Giang (=Ha-Jiang), Hà-Giang Province, in the northernmost part of Vietnam near the border with Yunnan Province of China. They include *Aporia giganthea* Koiwaya, 1993, *Sasakia charonda* (Hewitson, 1863), *S. funebris* (Leech, 1891), *Helcyra superba* Leech, 1890, *H. subalba* (Poujade, 1863), *Hestina assimilis* (Linnaeus, 1758) and others. To add to this list, we here report the discovery of a rare nymphalid butterfly of the subfamily Apaturinae, *Hestina nicevillei* (Moore, 1896) from Hà-Giang, which we consider to be a new subspecies with a number of unique characteristics.

This species has hitherto been known from Northern India, Nepal, Tibet and Southwestern China, and three subspecies have been described in addition to the nominotypical form occurring in Northwestern Himalaya and Western Nepal. Each subspecies with its characteristic color pattern exactly matches the local form of *Aporia agathon* (Gray, 1831), known to be an offensive butterfly for birds, indicating a classic example of Batesian mimicry (Morishita, 1997). It is, however, puzzling that this pierid species has thus far not been found around Hà-Giang. On the other hand, another *Aporia* species, *A. giganthea* Koiwaya, 1993, is common in Hà-Giang, and looks somewhat similar to a new subspecies of *H. nicevillei* below described as *magna* both in size and color pattern. Moreover, the new subspecies bears a striking resemblance to the white form of the allied species *H. assimilis*, f. *mena*, which is also very common in the area. The distribution of these two

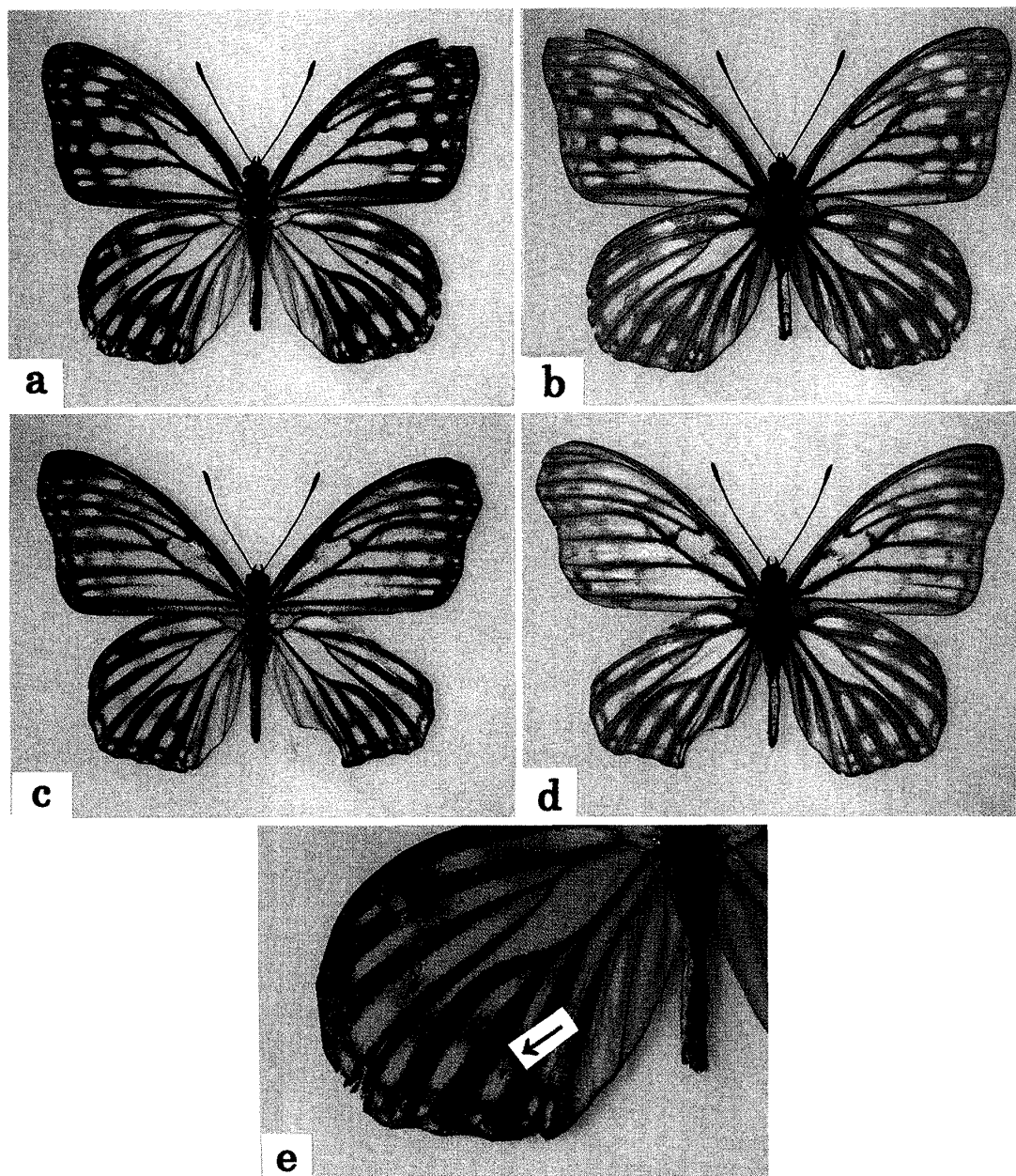


Fig. 1. Photographs of *Hestina nicevillei magna* ssp. nov. (a: holotype, ♂, upperside. b: ditto, underside. c: ♂ paratype, upperside. d: ditto, underside. e: a photograph of the enlarged part of hindwing showing a tiny, faint red spot indicated by an arrow.).

Hestina species as hitherto known has been allopatric, and the present report provides the first evidence of their sympatry.

At present, it is not known whether the unique characteristics of *H. nicevillei magna*, particularly its large size and whitish appearance, arose as the result of Batesian mimicry with *A. agathon* which has not yet been found, or of other processes such as convergence with *H. assimilis* (f. *mena*). Also, it remains unknown whether *A. gigantea* plays the role of mimetic model similar to that of *A. agathon* in other localities. There is however a problem with both theories, since both *A. gigantea* and *H. assimilis*, f. *mena* fly mainly in spring (March to May), while the specimens of *H. nicevillei magna* were collected in summer (June to August).

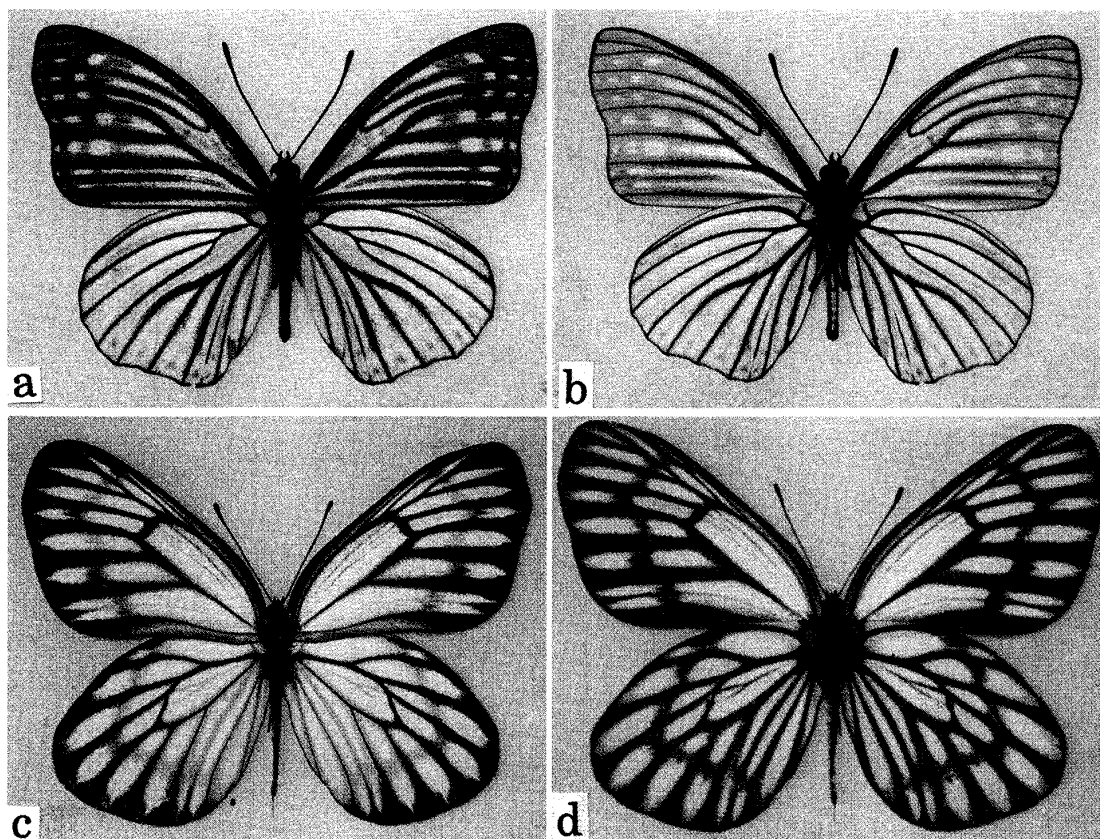


Fig. 2. Photographs of *Hestina assimilis*, f. *mena* (a: upperside, b: underside), and *Aporia giganthea* (c: upperside, d: underside).

***Hestina nicevillei magna* ssp. nov.** (Figs 1a–e)

♂. Size much larger than the known subspecies; forewing length 48 mm, as contrasted to 39–41 mm of other subspecies. Black area much reduced both on the forewing and the hindwing, the upperside being almost indistinguishable at the first glance from *H. assimilis*, f. *mena* (see Figs 1 and 2). On the underside, however, it is readily distinguished from *H. assimilis* by two conspicuous yellow areas, one at base and the other at inner margin of the hindwing. A tiny, faint red touch is observable in the space between veins 2 (CuA_2) and 3 (CuA_1) at the subcostal area of the hindwing, reminiscent of the red spots present in *Hestina assimilis*, indicating a close relationship of the two species (Fig. 1e). Also, the basal contour of the outer margin of the hindwing of *H. nicevillei* is different from that of *H. assimilis*. Thus, in the latter species, it is not smoothly round as in the former with a slight inward excision. Although this excision appears to be present in the paratype specimen (Figs 1c, d), it is probably due to an accidental deformation of this individual. Also, the color pattern is slightly different between the two specimens, the paratype specimen having the black marking more reduced than that of the holotype (Figs 1a, b).

♀. Unknown.

Holotype (Figs 1a, b). ♂, Hà-Giang (on the way to Dôn Vãn), alt. 2,000 m, Northern Vietnam, June 2003 (local collector leg.). Paratype (Figs 1c, d). 1 ♂, same locality, Aug. 2003 (local collector leg.). The type specimens are temporality preserved in K. Omoto's collection until finally lodged in the National Science Museum, Tokyo.

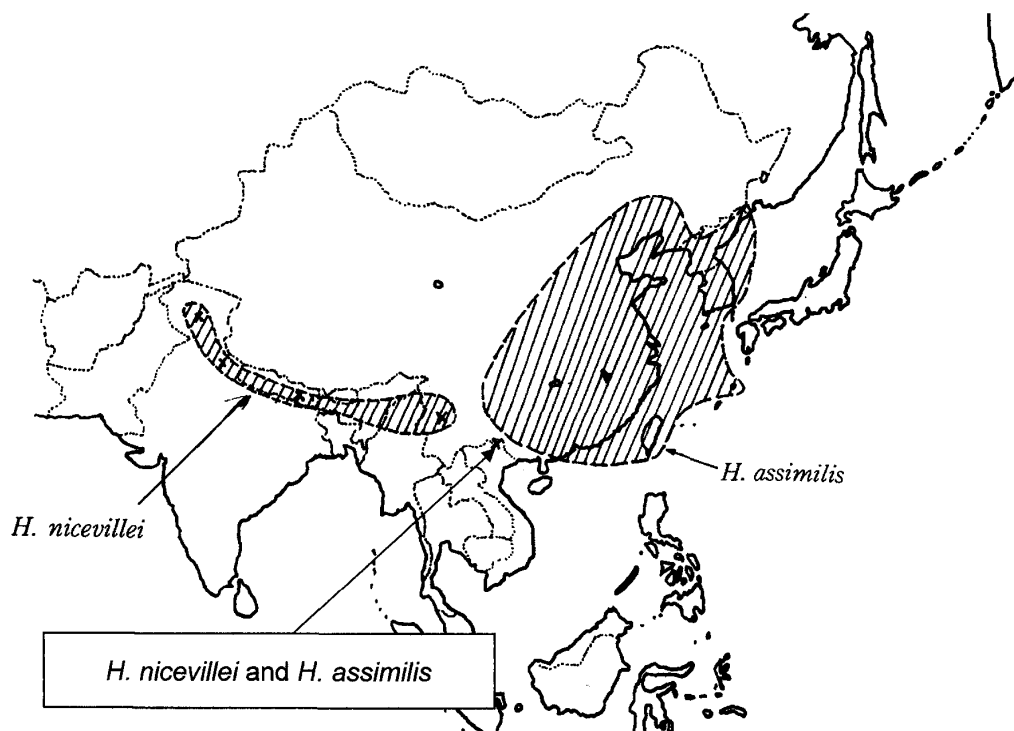


Fig. 3. Map showing the distribution of *Hestina nicevillei* and *H. assimilis* (adapted from Masui and Inomata (1997) with modifications).

Discussion

Hestina nicevillei is a rare species of the subfamily Apaturinae (Lepidoptera, Nymphalidae). Thus far, four subspecies have been known as listed below (Masui and Inomata, 1997; Morishita, 1997).

Ssp. *nicevillei* (Moore, 1896): NW Himalayas (Chumba-Kunjar); W Nepal.

Ssp. *jermyni* (Druce, 1911): Tons Valley, N India (Uttar-Pradesh).

Ssp. *ouvrardi* (Watkins, 1928): NW Yunnan; SE Tibet, China,

Ssp. *nigra* Morishita, 1997: Kathmandu Valley, C Nepal.

The present paper describes a fifth subspecies, *magna* ssp. nov., providing also a new record of the species from Vietnam as well as the first evidence for sympatry with its allied species *H. assimilis* (Fig. 3).

As described above, this new subspecies has several unique features and is readily distinguishable from all the known subspecies. It is the largest among the known subspecies, the forewing length of two male specimens (holo- and paratypes) being 48 mm. The forewing lengths of other subspecies measured by us (except ssp. *nicevillei* measured by Mr Kazuhiko Morishita) are as follows. All are male specimens, and the numbers in parentheses are the sample size. Ssp. *nicevillei* (1): 39 mm. Ssp. *ouvrardi* (5): 40–41 mm. Ssp. *nigra* (5): 39–40 mm. We were not able to measure the type specimen of ssp. *jermyni* preserved in Natural History Museum, London. This remarkable subspecies almost lacks the black marking, being more whitish than ssp. *magna*. The original description by Hamilton H. Druce gives the data of the “expanse” of 92 mm. According to Evance (1932), the expanse in the old British measurement system is not simply the distance between the apex of both wings in the expanded state, but “obtained by measuring from the centre of the thorax (the pin) to the tip of the forewing and doubling the result” (Evans, 1932: 12).

Following to this system of measurement, the length of the forewing of ssp. *jermyni* must be much smaller than the 48 mm of ssp. *magna*. The type specimen illustrated in D'Abrera's book "*Butterflies of the Holarctic Region, Part III*" (p. 377) indicates the forewing length as approximately 40 mm.

The important question is as to the origin of the large size and the unique color pattern of ssp. *magna*. All the known subspecies show striking similarities to those of the local forms of *A. agathon*. According to Morishita (1997), citing a personal communication of Haruo Kimura, this species is considered to be offensive for birds due to the poisonous substance derived from the larval food-plant of the genus *Berberis*. Thus, the color pattern of *H. nicevillei* with *A. agathon* as a model is considered to be a classic example of Batesian mimicry (Morishita, 1997).

We are puzzled, however, since this model pierid species has not been found around Hà-Giang, although quite a large number of butterflies has been collected. It occurs in Sapa, Lào Cai Province, about 100 km to the west of Hà-Giang on the opposite side of the River Hong. One of us (A. F.) has been both in Hà-Giang and Sapa, and finds that two habitats are markedly different in terms of biotope and fauna. Described as *A. agathon sapaensis* by Funahashi (2003), its coloration does not match that of *H. nicevillei magna*.

On the other hand, another species of the genus *Aporia*, *A. giganthea*, is common in Hà-Giang. With its large size and whitish coloration, it looks somewhat similar to ssp. *magna* (Figs 2c, d). It is not known whether *A. giganthea* represents an offensive species for birds like *A. agathon*, but one may speculate that this is the case for most *Aporia* species. One of the unique features of *H. nicevillei*, and not of *H. assimilis*, is a bright yellow spot at the base of hindwing underside, which is an important marking shared with the *Aporia* species.

The situation seems to be more complex, since *H. assimilis* is very common in Hà-Giang, and the white form (f. *mena*) is almost indistinguishable at the first glance from *H. nicevillei magna* (Figs 2a, b). Although the former lacks the basal yellow spot on the hindwing underside, both look very similar in size and color pattern, raising a question on the mechanism of Batesian mimicry. It is known that the color pattern of *H. assimilis* exhibits a remarkable variation. The white form, f. *mena*, is regarded as a seasonal form, but genetic factors may play a role in addition to the environmental factors like temperature and humidity. Thus, in Hong Kong, it is observed in spring (March to May) together with the usual form and a variety of intermediate forms (Wakabayashi, 1992). In Hà-Giang, Northern Vietnam, specimens of f. *mena* are collected mostly in April, while it is also taken in June at relatively high altitude, together with the usual form as well as all possible gradations of intermediate forms.

It is tempting to speculate that, at least in this particular area, the unique features of *H. nicevillei magna* arose as a result of convergence to *H. assimilis*, rather than the mimicry. It is notable that this area around Hà-Giang of Northern Vietnam is unique in that both *H. nicevillei* and *H. assimilis* occur together (Fig. 3). The finding that ssp. *magna* shows a tiny red spot on the hindwing indicates that *H. nicevillei* and *H. assimilis* are in fact closely related to each other, as suggested by Morishita (1997).

Future field studies are needed to answer the question on the origins of the unique features of *H. nicevillei magna*. Firstly, it is important to find out whether *A. agathon* in fact occurs somewhere in the area around Hà-Giang. It is tempting to speculate that, if it is found, it will prove to be as large and whitish as in *H. nicevillei magna* and *H. assimilis*, f. *mena*, which would provide a pointer to understanding the ecological relationship between them.

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摘 要

ベトナム産ニセビユゴマダラの1新亜種 (尾本恵市・舟橋彰男)

コムラサキ亜科の珍種ニセビユゴマダラは、従来ヒマラヤ南部から中国西部の地域より知られていたが、最近、ベトナム北部の Hà-Giang 市付近でオス2頭が発見された。アカホシゴマダラと同所的に産することは初記録である。比較の結果、既知の4亜種とは明瞭に区別されるので、ここに新亜種 *Hestina nicevillei magna* として記載する。主な特徴は、著しく大型 (前翅長 48 mm; 他の亜種では 41 mm 以下) で、表面の黒色部が大幅に縮小していること、さらに後翅外縁部に一個のごく微小な赤斑が認められることである。本種は、同所的に産するゴマダラシロチョウ (*Aporia agathon*) と斑紋が酷似する。このことは、後者が有毒物質によって鳥に忌避されると考えられるため、ベーツ式擬態の好例とされる (Morishita, 1997)。しかし、今回の発見地ではゴマダラシロチョウは発見されず、同属では唯一 *A. gigantea* を産するのみである。この種は、大型かつ黒色部が少ない点で亜種 *magna* とやや類似するため、擬態のモデルとしての可能性がないとはいえない。一方、亜種 *magna* は、同所的に多産するアカホシゴマダラの白化型 (f. *mena*) と形態的に酷似する。ただし、ニセビユゴマダラは後翅外縁の輪郭の相違に加えて、後翅裏面基部および内縁部に鮮やかな黄色紋が存在することによってアカホシゴマダラと区別される。亜種 *magna* の後翅に痕跡の赤斑が認められる点は、本種では初の例で、アカホシゴマダラとの系統的近縁性を物語る。今後の調査によって同地からゴマダラシロチョウが発見されれば、それは大型で白色部が拡大した形態をもつことが予想される。しかし、もし発見されない場合には、亜種 *magna* の斑紋形成にとって上述の2種の蝶が、擬態のモデル (*A. gigantea*) ないし収斂現象 (アカホシゴマダラ) などの可能性を含め、何らかの役割を演じたとも推定される。この仮説に対する問題点は、これら両者が春 (3–5 月) に出現するのに、亜種 *magna* は夏 (6–8 月) に採集されたことである。しかし、Hà-Giang 付近の比較的高地では f. *mena* が6月にも採集されているので、両者が無関係とは言いきれない。亜種 *magna* の特異な形態の起源という興味ある課題を解決するためには、野外調査による生態観察が必要である。

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